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Publication date:
2012

Document Version
Publisher's PDF, also known as Version of record

DTU Food
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In the scientific literature it is obligatory to control and report the test time and temperature applied when testing migration but it is not current practice to either control or report the relative humidity (RH)

The setup

The kinetics of benzophenone (BP, an UV photoinitiator) migration to the food simulant modified polyphenylene oxide (MPPO) was investigated at three different RHs, 44 5 %, 68 4 % and > 73 % respectively. All experiments were performed at 34 C (0.6 C).

Controlling the humidity

The relative humidity was controlled using saturated salt solutions placed in a small glass jar inside the migration cell.

The migration cell

The migration cell was a glass jar, with a metal screw cap, turned upside down (Figure 1). The printed paperboard was placed in the lid with the food contact side upwards. MPPO was placed on the paperboard. The migration cell was sealed with cling film.

Figure 1. The unassembled migration cell. To the left is the metal screw cap, with a special designed rack on, and on top a small glass jar containing the saturated salt solution. To the right is a paperboard sample with MPPO on top. In the back is the glass jar.

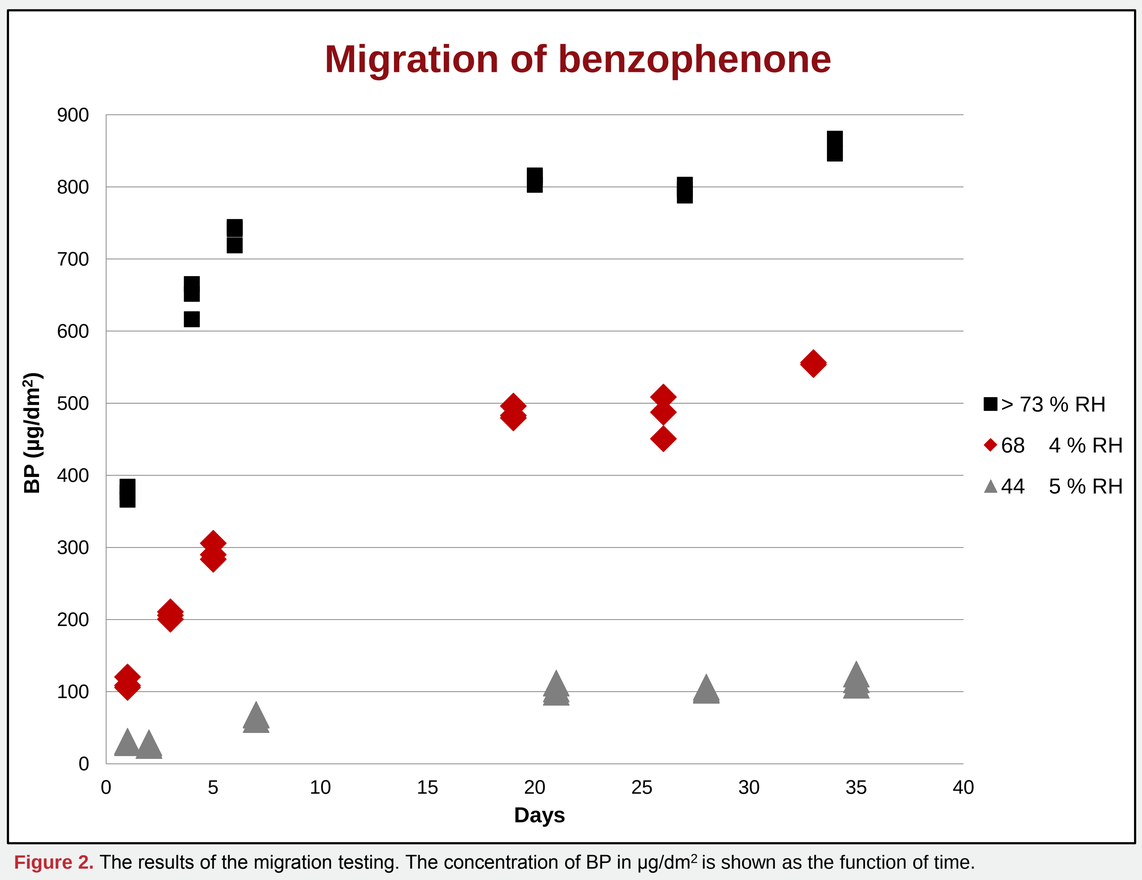

Figure 2. The results of the migration testing. The concentration of BP in µg/dm^2 is shown as the function of time.

After more than 30 days the migration of BP were found roughly to be 5 times higher at a RH of 68 %, and 7 times higher > 73 %, when compared to a RH of 44 %.

Analysis

MPPO was extracted using hexane. BP was analysed and quantified using a GC-MS.

Results

The RH had a great impact on the level of migration even at short exposure times of 24 hours (see Figure 2).

Consequence for future testing

These findings indicate that testing the migration from paperboard at elevated temperatures (usually 10 d at 40 C) without controlling the RH highly underestimates the level of migration of polar compounds. Probably, the RH influence migration rates at lower test temperatures as well.

(Barnkob & Petersen 2012)

Barnkob LB, Petersen JH. Forthcoming 2012. Effect of relative humidity on the migration of benzophenone from paperboard into the food simulant Tenax® and modelling hereof. DOI: 10.1080/19440049.2012.741717. Food Addit Contam.